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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/540,434	05/16/2006	Martin Hirsch	4791-4010	1637

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EXAMINER	
SHEVIN, MARK L	
ART UNIT	PAPER NUMBER
1793	

NOTIFICATION DATE	DELIVERY MODE
09/17/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/540,434	HIRSCH ET AL.	
	Examiner	Art Unit	
	Mark L. Shevin	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 June 2008 and 08 July 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) *11-18* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 June 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *06/22/2005, 10/17/2006, 06/23/2008, 07/08/2008, and 07/08/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status

1. Claims 1-18, filed June 24th, 2008, are pending.

Priority

2. Applicants' claim to foreign priority of German patent application DE 10260731.1, filed December 23rd, 2002, has been recorded.

Information Disclosure Statements

3. The information disclosure statements (IDS) submitted June 22nd, 2005, October 17th, 2005, June 23rd, 2008, and July 8th, 2008 are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statements have been considered by the examiner. Please refer to applicants' copies of the 1449 forms submitted herewith.

Restriction

4. Claims 11-28 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on June 23rd, 2008.

Applicant's election with traverse of Group I, claims 1-10 in the reply filed on June 23rd is acknowledged. The traversal (p. 6-7 of remarks) is on the ground(s) that the claimed special technical feature is not novel and non-obvious over the prior art . This is not found persuasive because Lapple does not disclose a tube where solids are entrained while passing through an upper orifice region.

In response, the Examiner must take the broadest reasonable interpretation of the claims at issue, consonant with the instant specification. In this case, the special technical feature requires that the gas flowing though the gas supply tube entrains solids when passing through the upper orifice region of the gas supply tube. Entrains, as defined by the Oxford English Dictionary, means to carry particles along by its flow. Lapple indeed does entrain particles while passing through an upper orifice region and the particles, supplied through holes **36** are already in the flow and in the process of being carried and are thus entrained.

The requirement is still deemed proper and is therefore made FINAL.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Joint Inventors

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation

under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. **Claims 1-4** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Hirsch** (US 5,527,379) in view of **Hiltunen** (US 5,505,907).

Regarding claim 1,

Hirsch:

Hirsch, drawn to a method of reducing iron oxide containing materials in a fluidized bed, teaches that in a first stage iron oxide is charged into a fluidized bed reactor, hot reducing gas is supplied as a fluidizing gas and the solids are separated out from the hot gas exhaust by cyclones (col. 2, lines 45-55). The solids are then recycled back to the fluidized bed (col. 2, lines 55-57). Solids from this first reducing stage are supplied in a second reducing stage to a second fluidized bed where the exhaust from this reactor is supplied as a secondary gas to help heat the first fluidized bed reactor (col. 2, lines 58-68). The temperature of the fluidized bed is adjusted to about 550 °C to 650 °C (col. 3, lines 52-68).

The operating conditions of the fluidized bed reactor(s) are defined by the particle Froude and Archimedes numbers as described in col. 3, lines 22-52).

Hirsch does not teach a central gas supply tube where the gas flowing through the tube entrains solids from the stationary annular fluidized bed into the mixing chamber when passing through the upper orifice region of the tube.

Hiltunen:

Hiltunen, drawn to an apparatus for utilizing a hot gas flow (Title), teaches a reactor **10** with an annular chamber **12** provided with a fluidized bed **14**. A central gas inlet duct / conduit (gas supply tube) **16** surrounded by the stationary fluidized bed and the top edge (upper orifice) is even with the top surface of the fluidized bed **20** (col. 4, lines 1-6). The reactor functions by pushing particles as overflow **50** over the inlet duct edges **18** where the hot gas flowing through the inlet cools and correspondingly heats the solid particles (col. 4, lines 45-55).

Appropriate fluidizing is maintained by flowing fluidizing gas through nozzles **52** in to the annular chamber **12** and the volume of the solid particles in the reactor may be regulated by adding particles via conduit **54** or by discharging them via conduct **56**.

The upper surface of the bed **14,** may be arranged a higher level than the top level of the duct **16** and its edges **18** so that solid particles overflow **50** and are entrained in the hot gas supply (col. 6, lines 15-50), the advantage being less fouling and clogging of the inlet duct.

Thus it would have been obvious to one of ordinary skill in fluidized bed furnace design, at the time the invention was made, to modify the process of Hirsch to utilize a fluidized bed with a centrally located gas supply tube and entrainment system of Hiltunen as Hiltunen as he taught that his particle overflow and gas entrainment method reduced fouling and improved heat exchange. Both patents are drawn to the common problem of maximizing heat exchange to transfer heat from a hot gas to cooler particles.

With respect to the particle-froude-numbers specified in claim 1, Hirsch teaches that the operating conditions of the fluidized bed reactor(s) are defined by the particle

Froude and Archimedes numbers as described in col. 3, lines 22-52 and thus teaches the particle-froude-number as result effective variables in the operation of such a reactor and the effective heat treatment of fine-grained solid metal oxides. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to choose the instantly claimed ranges through process optimization, since it has been held that there the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch, 205 USPQ 215 (CCPA 1980).

Regarding claims 2-4, With respect to the particle-froude-numbers specified in claims 2-4, Hirsch teaches that the operating conditions of the fluidized bed reactor(s) are defined by the particle Froude and Archimedes numbers as described in col. 3, lines 22-55 and thus teaches the particle-froude-number as result effective variables in the operation of such a reactor and the effective heat treatment of fine-grained solid metal oxides. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to choose the instantly claimed ranges through process optimization, since it has been held that there the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch, 205 USPQ 215 (CCPA 1980).

Regarding claim 5, Hiltunen teaches that the upper surface of the fluidized bed **14,** may be arranged a higher level than the top level of the duct **16** and its edges **18** so that solid particles overflow **50** and are entrained in the hot gas supply (col. 6, lines 15-50),

Regarding claim 6, Hirsch teaches that iron ores are fine-grained iron oxide containing materials (col. 1, lines 12-17) and discloses specific examples of the process applied to iron ore (col. 8, lines 25-62 and col. 8, line 65 to col. 9, line 32).

Regarding claim 7, Hirsch teaches that the preheated reduction gases have a hydrogen content of 50-85 vol % (col. 6, lines 28-32) and that the invention affords the advantage that still higher H2 contents may be used, which would be expected to result in lower recycle gas rates and consequently energy savings (col. 6, lines 18-25). Lastly, the makeup gas used in the examples is 97% hydrogen gas. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to choose the instantly claimed ranges through process optimization, since it has been held that there the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch, 205 USPQ 215 (CCPA 1980). MPEP 2144.05, para I states: “In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists.”

Regarding claim 8, the reduction gas is cleaned in a reprocessing stage downstream of the reactor, in a scrubber **29** and subsequently recirculated to the reactor (col. 7, lines 54-68, col. 8, lines 45-62, and col. 9, lines 15-33).

Regarding claim 9, Hirsch teaches that solids from the first reducing stage are supplied in a second reducing stage to a second fluidized bed where the exhaust from this reactor is supplied as a secondary gas to help heat the first fluidized bed reactor (col. 2, lines 58-68). Hiltunen further teaches that hot gas is introduced through inlet

duct **16** (col. 4, lines 39-41). It would have been obvious to one of ordinary skill in fluidized bed furnace design, at the time the invention was made to direct the hot exhaust gas from the second reactor into the gas supply tube of the first fluidized bed reactor as Hiltunen taught that his central gas supply tube was designed for the input of hot gas and Hirsch taught the recycling of hot gas in his iron oxide reduction process.

Regarding claim 10, Hirsch teaches that the solids should be preheated in one or more suspension heat exchangers before they are supplied to the first fluidized bed reactor (col. 7, lines 1-10).

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

6. **Claims 1-6** are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-29 of copending Application

No. 10-540,435. Although the conflicting claims are not identical, they are not patentably distinct from each other for the following reasons:

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim 1 of '435 discloses a method for the heat treatment of solids containing iron oxide, wherein the solids are heated to a temperature of about 700° to 1150°C in a fluidized bed that is identical in function and particle-froude-number as instantly claimed in claim 1.

Regarding claim 1, it would have been obvious to one of ordinary skill in fluidized bed furnace design, to modify the process of claim 1 of '435 to operate in the instantly claimed temperature range as one would have been motivated to choose the instantly claimed ranges through process optimization, since it has been held that there the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch, 205 USPQ 215 (CCPA 1980). MPEP 2144.05, para I states: "In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists."

Regarding claims 2-4, claims 2-4 of '435 teach these particle-froude-numbers.

Regarding claim 5, claim 5 of '435 claims this feature.

Regarding claim 6, claim 6 of '435 claims iron ore

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

7. **Claims 1-7 and 9** are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of copending Application No. **10-540,376** (claims as of 09/02/2008) in view of **Hirsch** (US 5,527,379 A1). Although the conflicting claims are not identical, they are not patentably distinct from each other for the following reasons:

Claim 1 of '376 discloses a method for heating fine grained solids containing titanium (versus iron oxide in the instant claims) at a temperature in the range of instant claim 1 with the same annular fluidized bed, particle-froude-numbers, and particle entrainment.

'376 does not disclose applying the process to solid containing iron oxides.

Hirsch, drawn to a method of reducing iron oxide containing materials in a fluidized bed, teaches that in a first stage iron oxide is charged into a fluidized bed reactor, hot reducing gas is supplied as a fluidizing gas and the solids are separated out from the hot gas exhaust by cyclones (col. 2, lines 45-55). The solids are then recycled back to the fluidized bed (col. 2, lines 55-57). Solids from this first reducing stage are supplied in a second reducing stage to a second fluidized bed where the exhaust from this reactor is supplied as a secondary gas to help heat the first fluidized bed reactor (col. 2, lines 58-68). The temperature of the fluidized bed is adjusted to about 550 °C to 650 °C (col. 3, lines 52-68). Thus that the heat treatment process of '376 may be used on other solids beyond only those containing titanium.

Regarding claims 1 and 6, it would have been obvious to one of ordinary skill in fluidized bed furnace design, to modify the process of '376 to conduct the heat

treatment method on iron oxides to reduce iron oxides as both processes are similar in that they are both drawn to the problem of heat treating fine grained solids such as ore (iron ore of instant claim 6 and ilmenite [titanium ore] of claim 7).

Regarding claims 2-4, claims 2-4 of '376 teach these particle-froude-numbers.

Regarding claim 5, claim 5 teaches adjusting the height of the fluidized bed to achieve this effect.

Regarding claim 7, claims 8 and 9 disclose supply hydrogen gas to the fluidized bed.

Regarding claim 9, claims 12, 15, and 17 disclose recycling the hot exhaust gas from a second downstream reactor to the first fluidized bed reactor through a gas supply tube.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

8. **Claims 1-6 and 15** are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-24 of copending Application No. **10-540,438** (claims as of 12/10/2007) in view of **Hirsch** (US 5,527,379 A1). Although the conflicting claims are not identical, they are not patentably distinct from each other for the following reasons:

Claim 1 of '438 discloses a method for conveying fine grained solids containing using the same annular fluidized bed, particle-froude-numbers, and particle entrainment.

Claims 10-13, disclose that heated gas is used to treat solids containing iron oxides and that the gas may be heated by fuel

‘438 does not disclose the temperature of the hot gases.

Hirsch, drawn to a method of reducing iron oxide containing materials in a fluidized bed, teaches that in a first stage iron oxide is charged into a fluidized bed reactor, hot reducing gas is supplied as a fluidizing gas and the solids are separated out from the hot gas exhaust by cyclones (col. 2, lines 45-55). The solids are then recycled back to the fluidized bed (col. 2, lines 55-57). Solids from this first reducing stage are supplied in a second reducing stage to a second fluidized bed where the exhaust from this reactor is supplied as a secondary gas to help heat the first fluidized bed reactor (col. 2, lines 58-68). The temperature of the fluidized bed is adjusted to about 550 °C to 650 °C (col. 3, lines 52-68).

Regarding claims 1 and 6, it would have been obvious to one of ordinary skill in fluidized bed furnace design, to modify the process of '438 to conduct the heat treatment method on iron oxides to reduce iron oxides in the temperature range provided in order to effect successful reduction of iron oxides as taught by Hirsch.

Regarding claims 2-4, claims 2-4 of ‘438 teach these particle-froude-numbers.

Regarding claim 5, claim 5 teaches adjusting the height of the fluidized bed to achieve this effect.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

> **Y.T. Kim** et al, Entrainment of solids in an internally circulating fluidized bed with draft tube. *Chemical Engineering Journal*, Vol. 66, (1997), p. 105-110.

-- Claims 1-10 (All elected) are rejected
-- No claims are allowed

The rejections above rely on the references for all the teachings expressed in the text of the references and/or one of ordinary skill in the metallurgical art would have reasonably understood or implied from the texts of the references. To emphasize certain aspects of the prior art, only specific portions of the texts have been pointed out. Each reference as a whole should be reviewed in responding to the rejection, since other sections of the same reference and/or various combinations of the cited references may be relied on in future rejections in view of amendments.

All recited limitations in the instant claims have been met by the rejections as set forth above. Applicant is reminded that when amendment and/or revision is required, applicant should therefore specifically point out the support for any amendments made to the disclosure. See 37 C.F.R. § 1.121; 37 C.F.R. Part §41.37 (c)(1)(v); MPEP §714.02; and MPEP §2411.01(B).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark L. Shevin whose telephone number is (571) 270-3588 and fax number is (571) 270-4588. The examiner can normally be reached on Monday - Friday, 8:30 AM - 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V. King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Mark L. Shevin/

/Roy King/

Supervisory Patent Examiner, Art Unit 1793

10-540,434
September 8th, 2008